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Domain decomposition method with non-overlapping subdomains for elliptic variational inequalities using Lagrange multipliers

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Abstract

DDM are thoroughly studied in the case of the linear boundary-value problems for partial differential equations(PDE's). On the other hand there are few results concerning these methods for free boundary problems (FBP's). We mention the articles [1-5] dealing with the overlapping and non-overlapping DDM's for the elliptic variational inequalities (VI's) and some evolutionary FBP's. One of the motivation to use the DDM especially for FBP's is as follows. Usually we can localize the free boundaries on the basis of a priori and/or a posteriori information and divide the initial domain into two groups of subdomains in such a way that a solution for the problem under consideration satisfies a PDE in the first group of the subdomains while a FBP in the second one. Thus we can use the different approaches to solve the problems in the subdomains (using grid refinement, multigrids, efficient linear algorithms etc.) The aim of the report is to develop the non-overlapping DDM for the stationary VI's using a general framework.